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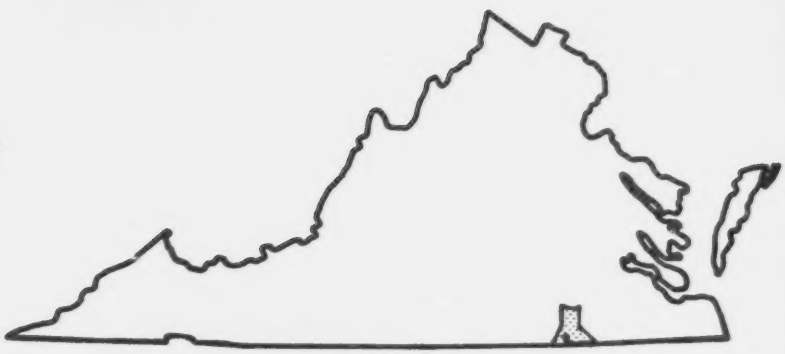
FLOOD INSURANCE STUDY

CITY OF EMPORIA, VIRGINIA
INDEPENDENT CITY



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FEBRUARY 2, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 510047

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
INDEPENDENT CITY OF EMPORIA, VIRGINIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for the Independent City of Emporia, Virginia. This information will be used by the City of Emporia to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study represent a revision of the original analyses prepared by the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA) under Inter-Agency Agreement No. H-16-75, Project Order No. 16 and Inter-Agency Agreement No. H-7-76, Project Order No. 1.

In this revision, the hydrologic and hydraulic analyses for the Meherrin River and Falling Run were prepared by Dewberry & Davis to incorporate areas annexed by the City of Emporia. All materials necessary to process this study were received by FEMA on January 12, 1988.

1.3 Coordination

Two preliminary meetings were held with representatives of FEMA, the city, the Virginia State Water Control Board, and the COE: November 21, 1974, a Time and Cost meeting; and July 25, 1975, a Coordination meeting.

On February 3, 1976, an initial Consultation and Coordination Officer's meeting was held with representatives of FEMA, the city, the Virginia State Water Control Board, and the COE (the study contractor) to identify the streams to be studied by detailed methods.

Topographic maps of the study area were provided by the U. S. Geological Survey (USGS). The U. S. Coast and Geodetic Survey (USC&GS) furnished the location and description of elevation reference marks. Additional elevation reference marks were set by the COE.

On June 2, 1976, a final CCO meeting was held with representatives of FEMA, the city, the Virginia State Water Control Board, and the study contractor to review the results of the original study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Emporia, Virginia. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the Meherrin River, from a point approximately 75 feet upstream of the corporate limits to approximately 1,575 feet upstream of Interstate Route 95; and Falling Run from approximately 1,650 feet downstream of State Route 730 (Ground Road) to the upstream corporate limits. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

All or portions of the following streams were studied by approximate methods: Falling Run, Metcalf Branch, Three Creek, and the Meherrin River. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Emporia.

2.2 Community Description

The Independent City of Emporia is located along the Meherrin River in central Greensville County. It is situated in the southeastern portion of the state near the Virginia-North Carolina state line, and is completely surrounded by the unincorporated areas of Greensville County. Emporia encompasses an area of 2.4 square miles and had a 1970 population of 5,300.

Manufacturing and trade are the principal sources of employment in the city. Most of the manufacturing plants are located in or near Emporia. Pre-fabricated homes, wooden boxes and crates, plywood, and fabrics are some of the products manufactured in the area.

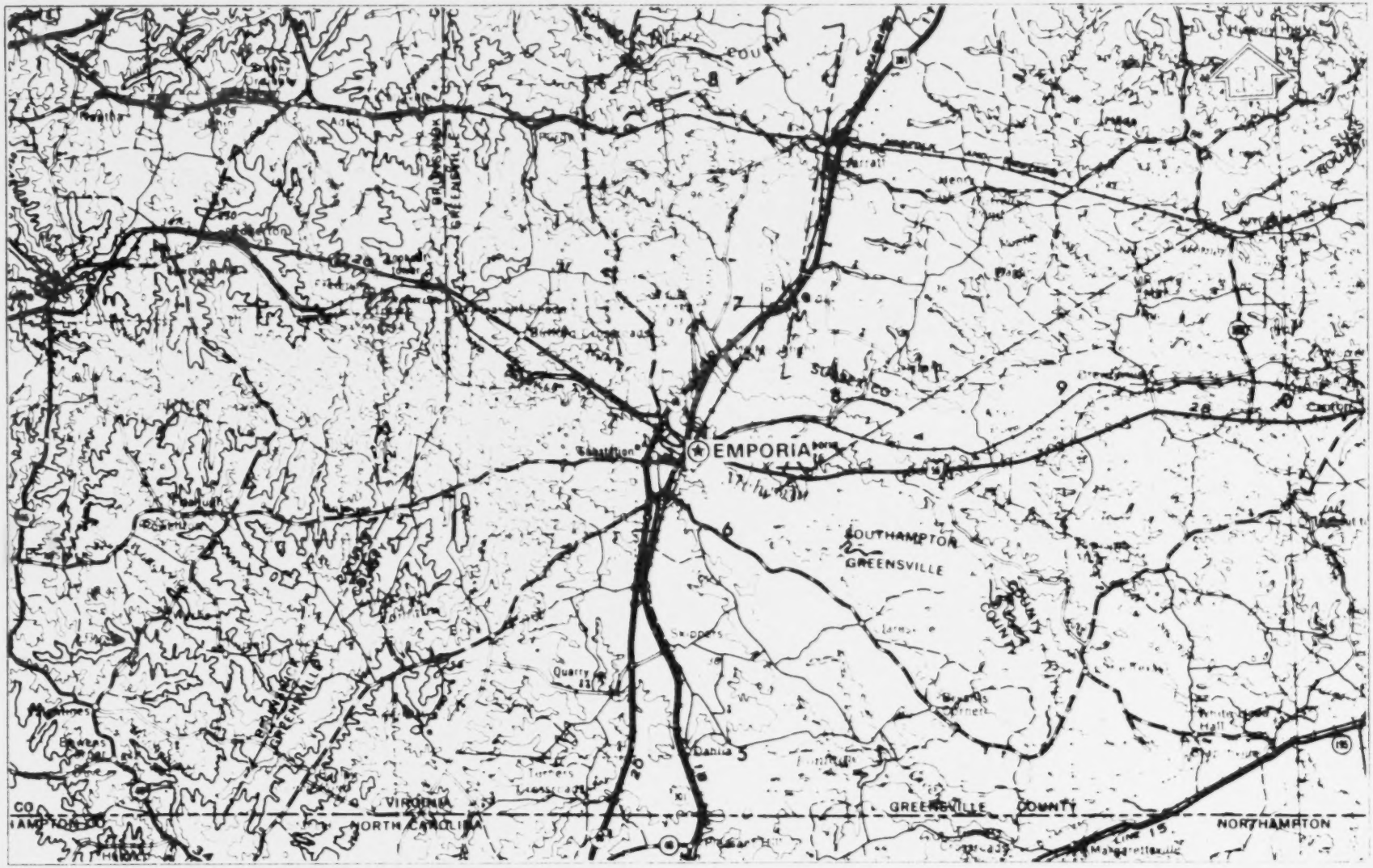


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA

(INDEPENDENT CITY)

APPROXIMATE SCALE

2000 0 2000 4000 6000 FEET

VICINITY MAP

Explored as early as 1670, the area was not settled until 1710. In 1796, the Town of Hicksford was founded on one bank of the Meherrin River and in 1798, the Town of Belfield was established on the opposite bank. In 1887, the two villages merged to become the incorporated Town of Emporia. Emporia has progressed from a town to its present status of a second-class city.

The City of Emporia lies in both the Piedmont and the Coastal Plain areas of Virginia. Therefore, it has a variety of soils, heavy clays, as well as light sandy loams. The topography of the area is characterized by gently rolling terrain with elevations varying from 75 to 140 feet above mean sea level. Emporia employs a mild climate characterized by moderately warm summers with temperatures averaging 78 degrees Fahrenheit (^{o}F) in July. The winters are cool with temperatures averaging 40^{o}F in January. Annual precipitation over the basin averages about 46 inches. There is some variation in the monthly averages; however, this rainfall is distributed fairly uniformly throughout the year.

The Meherrin River flows in a southeastern direction through the center of the city. The channel is relatively well defined, with overbank areas generally covered with varying amounts of vegetation and tree cover. The remaining two streams, Metcalf Creek and Falling Run, border the corporate limits of the city on the north and south, respectively. There are numerous dwellings and small businesses located in the floodplain of the Meherrin River.

2.3 Principal Flood Problems

Floods have occurred and can be expected to occur on the Meherrin River during all seasons of the year. At Emporia, the Meherrin River drains an area of about 749 square miles. The basin is long and narrow, averaging about 59 miles in length and 13 miles in width. Because of this shape, extreme floods are caused by storms that produce rainfall over an extended period of time and over the entire area rather than by heavy rainfall concentrated in a short period of time and over a portion of the area, as occurs during summer thunderstorms.

The rate of rise and duration of flooding depend largely on the time required for floodwaters to concentrate at a particular point and on the duration and intensity of flood-producing rainfall. The drainage characteristics of the Meherrin River Basin are such that flooding in the study area is typically produced by a slowly rising flood wave followed by a slow recession, thus causing flood stages to last for several days. Stream velocities during floods depend largely on the size and shape of the cross sections, roughness conditions of the stream which tend to retard the flow, and the bed slope, all of which vary on different streams and at different locations on the same stream. During all major floods, high velocity floodflows and hazardous conditions would exist in the main stream channel and in some parts of the floodplain.

Emporia has experienced floods since the early settlement of the area. The following paragraphs discuss some of the larger known floods which have occurred in recent history. This information is based on newspaper accounts, historical records, field investigations, and routine data collection programs normally carried out by the Norfolk District COE.

The August 1940 flood was the largest recorded flood ever to occur on the Meherrin River. It was caused by heavy rainfall associated with a hurricane that passed through southern Virginia on August 14 and 15. Rain fell for three days and ranged from 17.5 inches near the headwaters of the watershed to about 11 inches in Emporia. Buildings and residences in the area were flooded from 6 inches to about 4 feet. The hydroelectric power plant owned by the Virginia Public Service Company was completely inundated by the flood. Figure 2 is an aerial view of Emporia showing the extent of this flood in the vicinity of U. S. Route 301 (Main Street) and CSX Transportation.

The flood of October 1972 was caused by heavy rains from a storm that began on the 4th and continued through the 7th. Recorded rainfall in the Meherrin River watershed was 9.7 inches at Lawrenceville, Virginia, and 2.3 inches at Emporia. Figures 3 and 4 show scenes from the October 1972 flood.

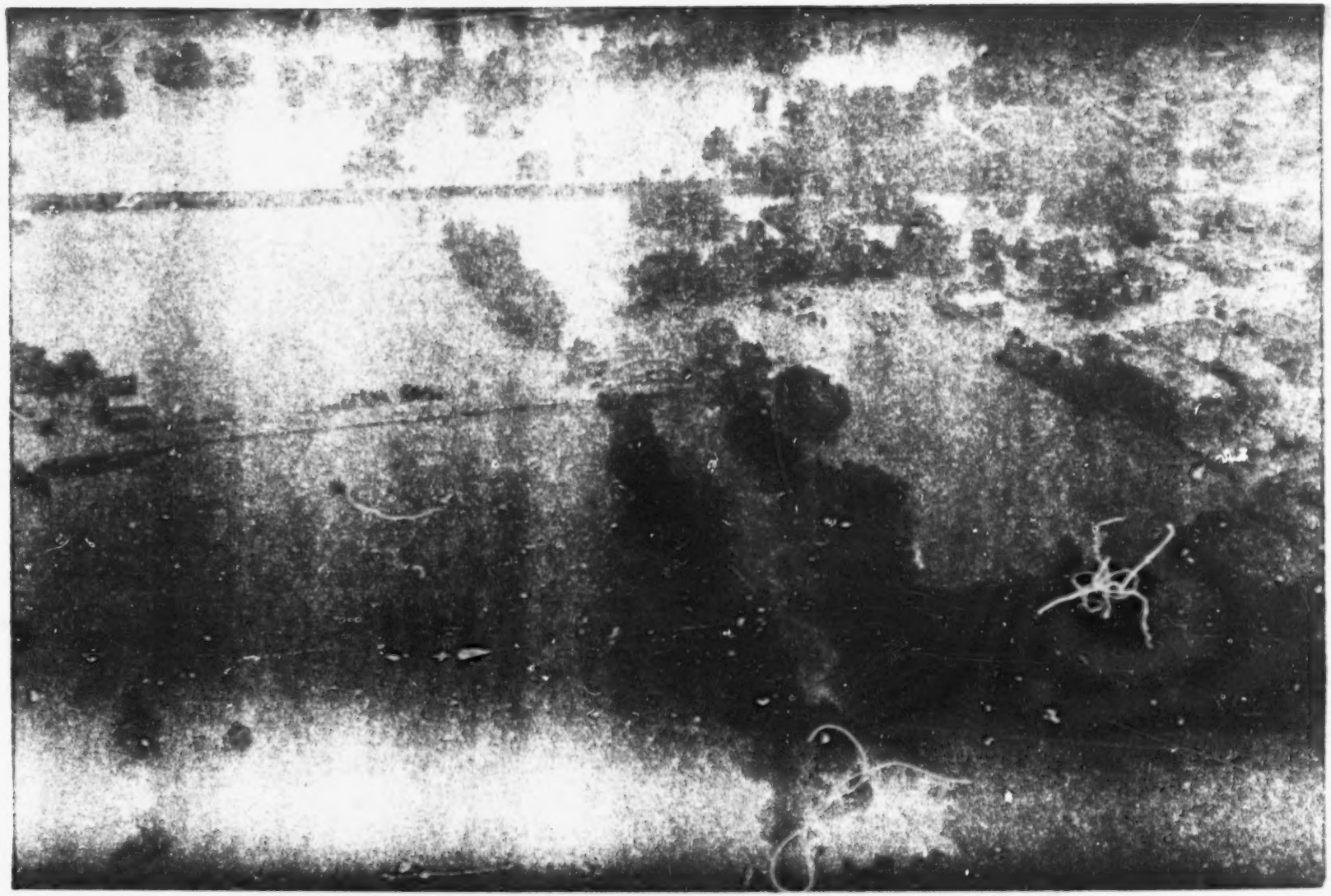
Unusually high precipitation occurred during the first two weeks of July, causing flooding along the Meherrin River. Figures 5 and 6 depict the Meherrin River at the U. S. Route 301 (Main Street) bridge during the flood crest and at normal flow.

A gage on the Meherrin River is located downstream of the U. S. Route 301 (Main Street) bridge (Reference 1). A peak discharge-frequency curve was developed by statistical methods (Reference 2).

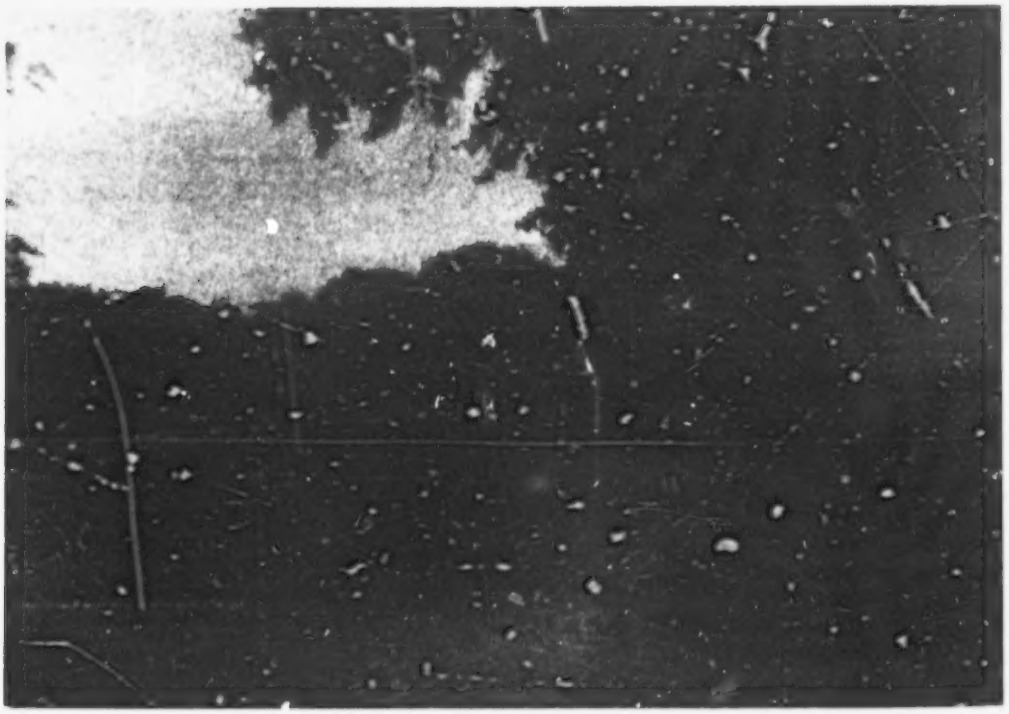
2.4 Flood Protection Measures

There are no existing flood control structures that would provide protection during major floods in the study area. The Virginia Electric and Power Company dam, located just inside the western corporate limits of the city, was constructed in 1909 for the purpose of generating electric power. The original storage capacity of the reservoir was about 3,000 acre feet. The space available for storage is probably considerably less at the present time due to filling by sediment. Since the volume of storage is small, the reservoir has no significant effect on floods at Emporia. The water-surface of the reservoir generally remains near the crest of the spillway except in extreme drought or floods.

The "Uniform Statewide Building Code," which went into effect in September 1973, states, "where a structure is located in a 100-year



AERIAL VIEW OF MAIN STREET - U.S. Route 301 (Main Street) and CSX Transportation During August 1940 Flood
Figure 2 - August 1940 Flood Scene



Flood Water Over Cleveland Avenue, Looking West From Lee Street (October 1972 Flood)
Figure 3

Meherrin River, Looking South Along Upstream Side of U.S. Route 301 (Main Street) Bridge (October 1972 Flood)

Figure 4

State Water Control Board Gage on Meherrin River at Flood Crest During the Flood of July 1975

Figure 5

State Water Control Board Gage on Meherrin River During Normal Flow After the Flood of July 1975

Figure 6

floodplain, the lowest floor of all future construction or substantial improvement to an existing structure . . ., must be built at or above that level, except for non-residential structures which may be flood-proofed to that level." These requirements will no doubt be beneficial in reducing future flood damages in the community.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the community.

For the Meherrin River, floodflow frequency data were based on statistical analysis of stage discharge records covering a 36-year period at the Virginia State Water Control Board Gage located downstream of U. S. Route 301 (Main Street) (Reference 1).

The hydrologic analyses for Falling Run was obtained from the Flood Insurance Study for the unincorporated areas of Greensville County (Reference 3).

In that study, regional regression methods of the U. S. Geological Survey (USGS) were used to estimate peak discharges for the 10-, 50-, 100-, and 500-year floods for Falling Run (References 4, 5, and 6). Those regional methods considered gaging stations on nearby streams with similar watershed conditions. The major watershed parameter considered in the correlation was drainage area.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of all streams studied are shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MEHERRIN RIVER					
At Emporia Gage No. 2052	747	16,250	30,500	39,500	70,000
FALLING RUN					
At State Route 730	5.89	700	1,500	1,900	3,200

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the Meherrin River were field surveyed and located at close intervals above and below bridges in order to accurately compute the backwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 7). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevations for both streams studied in detail were determined by the slope/area method.

Roughness coefficients (Manning's "n") used in the hydraulic computations were assigned on the basis of field observations of the stream and floodplain areas. Roughness coefficients for the Meherrin River were also based on HEC-2 computer calibration runs using known discharges and high-water marks of the August 1940, October 1972, and July 1975 floods. For the Meherrin River, the channel "n" value was 0.075 and the overbank "n" value was 0.150. For Falling Run, the channel "n" values ranged from 0.050 to 0.060 and the overbank "n" values ranged from 0.060 to 0.080.

The hydraulic analyses for Falling Run was obtained from the Flood Insurance Study for the unincorporated areas of Greensville County (Reference 3).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 8).

For the streams studied by approximate methods, the 100-year floodplain boundaries have been delineated using the previous Flood Insurance Study for the City of Emporia or by some combination of the following: correlations with nearby streams that were studied in detail; field reconnaissance; and engineering judgment (Reference 9).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for Falling Run extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 7.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Falling Run are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Meherrin River								
A	90[1]	3,338	34,868	1.1	93.9	93.9	94.0	0.1
B	1,590[1]	2,370	19,688	2.0	94.5	94.5	94.7	0.2
C	4,900[1]	775	10,150	3.9	97.8	97.8	98.2	0.4
D	6,490[1]	670	12,480	3.2	99.1	99.1	100.0	0.9
E	7,220[1]	1,240	13,720	2.9	100.4	100.4	101.3	0.9
F	8,500[1]	740	14,100	2.8	101.6	101.6	102.5	0.9
G	10,425[1]	530	11,180	3.5	102.9	102.9	103.9	1.0
H	12,150[1]	590	12,790	3.1	104.3	104.3	105.3	1.0
Falling Run								
A	9,100[2]	209/0[3]	1,033	1.8	94.0	88.3[4]	89.3	1.0
B	10,330[2]	114/20[3]	546	3.5	94.0	92.3[4]	93.2	0.9
C	10,880[2]	102/50[3]	599	3.2	95.4	95.4	96.4	1.0
D	11,820[2]	245/170[3]	1,136	1.7	98.2	98.2	99.2	1.0
E	13,240[2]	200/50[3]	3,440	0.6	113.9	113.9	114.9	1.0
F	14,030[2]	200/50[3]	3,080	0.6	113.9	113.9	114.9	1.0
G	15,100[2]	200/70[3]	2,326	0.8	114.0	114.0	115.0	1.0

[1]Feet above corporate limits
[2]Feet above confluence with Meherrin River
[3]Width/width within corporate limits
[4]Elevation computed without consideration of backwater effects from the Meherrin River

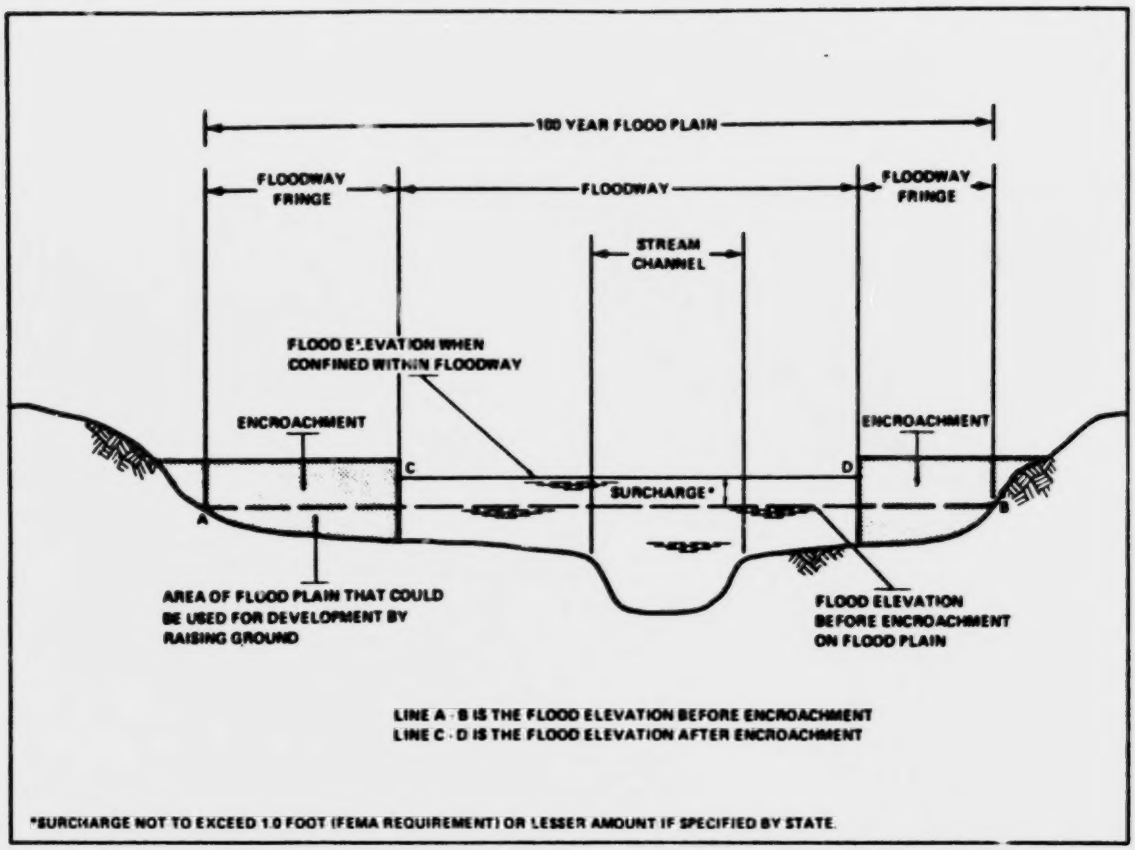
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA
(INDEPENDENT CITY)

FLOODWAY DATA

MEHERRIN RIVER - FALLING RUN


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 7

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

A Flood Plain Information (FPI) Report and Technical Appendix for Emporia has been prepared by the COE (Reference 10). In the Technical Appendix, the August 1940 flood and 50-year flood profiles are shown. The 50-year flood profiles in the report is lower than the 50-year profile determined in this study. An additional 12 years of record, during which time two large floods occurred, provided more data for developing the frequency curve for this study. Other data contained in the FPI Report and Technical Appendix are in agreement with this study.

A Flood Insurance Study has been prepared for the unincorporated areas of Greensville County (Reference 3). The results of this study are in complete agreement with the results of that study.

Due to its more up-to-date nature, this study supersedes the previous Flood Insurance Study for the Independent City of Emporia (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

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8. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Emporia, Virginia, 1963, Photorevised 1968 and 1973.

9. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Independent City of Emporia, Virginia, Washington, D. C., September 30, 1977.

10. U. S. Army Corps of Engineers, Flood Plain Information Report and Technical Appendix, July 1964.

U. S. Department of the Interior, Geological survey, Maps of Flood-Prone Areas, Scale 1:24,000, contour Interval 10 Feet: Emporia, Virginia, 1969.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	01	93.92	From intersection of East Atlantic Street (U. S. Route 58) and Reese Street, go north approximately 0.7 mile on Reese Street to bridge crossing Metcalf Branch. Bench mark is standard COE disk, stamped BM EM 10 1976 set in top of concrete monument approximately 8 inches above ground surface 45 feet south of south corner of Community Grocery No. 2, 29 feet east of east corner of house no. 921, and 10.5 feet southwest of southwest end of bridge crossing Metcalf Branch on west side of Reese Street.
RM 2	01	123.72	Bench mark is located at Welton Mills, Inc., on right bank of the Meherrin River approximately 500 feet downstream of VEPCO dam. Bench marks is standard COE disk, stamped EM No. 3, 1963, set in top of concrete monument 20.79 feet east of northeast corner of Welton Mills, Inc., building on line with north face of building. Mark is approximately 4 inches below surface of ground.
RM 3	01	115.941	Travel approximately 0.5 mile south along Interstate Route 95 from crossing of U. S. Route 58. Bench mark is standard USC&GS disk, stamped C 382 1959, located in top of west end of north abutment of southbound traffic lane bridge over the Meherrin River. Disk is 18 feet west of centerline of southbound traffic lane and approximately level with highway.
RM 4	01	114.06	From courthouse on U. S. Route 301 (Main Street), go north along U. S. Route 301 (Main Street) approximately 0.45 mile to West End Boulevard - Virginia Avenue. Turn left on West End Boulevard and go northwest approximately 0.55 mile to Gay Street. Reference mark is 1-inch iron pipe filled with concrete and set in concrete patty. Pipe extends 1 inch above surface of concrete patty and is located south of West End Boulevard and east of Gay Street on northwest corner of corner lot.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 5	02	101.92	From courthouse on U. S. Route 301 (Main Street), go north 0.45 mile along U. S. Route 301 (Main Street) to West End Boulevard - Virginia Avenue. Bench mark is standard COE disk, stamped BM EM8 1976, set in top of concrete monument approximately 2 inches above ground located between curb and sidewalk on west side of U. S. Route 301 (Main Street) and on north side of West End Boulevard.
RM 6	02	94.88	From courthouse on U. S. Route 301 (Main Street), go south 0.05 mile along U. S. Route 301 (Main Street) to Brunswick Avenue - Hicksford Avenue. Turn left on Hicksford Avenue and go east approximately 0.4 mile to Center Street. Turn left on Center Street and go north approximately 0.4 mile to Park Avenue. Bench mark is standard COE disk, stamped BM EM7 1976, set in top of concrete monument approximately 2 inches above and 6 inches from curb, between curb and sidewalk, along south side of Park Avenue and 8 feet west of curb on Center Street.
RM 7	02	104.18	From courthouse on Main Street, go south along Main Street 0.05 mile to Brunswick Avenue - Hicksford Avenue. Turn left on Hicksford Avenue and go east approximately 0.4 mile to Center Street. Turn left on Center Street and travel approximately 0.5 mile north to Southampton Street. Turn right on Southampton and go east 0.03 mile to Broad Street. Bench mark is standard COE disk, stamped EM No. 5, 1963, set in top of concrete monument located at southwest intersection of Southampton Street and Broad Street.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 8	02	142.47	From courthouse on U. S. Route 301 (Main Street), go south along U. S. Route 301 (Main Street) approximately 0.05 mile to Brunswick Avenue - Hicksford Avenue. Turn right on Brunswick Avenue and go west approximately 0.6 mile to West York Drive. Turn right on West York Drive and go north 0.15 mile to Shady Lane Avenue. Bench mark is standard COE disk, stamped EM No. 2, 1963, set in top of concrete monument 2 inches above ground surface located at northwest intersection of West York Drive and Shady Lane Avenue.
RM 9	02	115.46	From courthouse on U. S. Route 301 (Main Street), go north along U. S. Route 301 (Main Street) approximately 0.1 mile to intersection of U. S. Route 301 (Main Street) and Battery Avenue. Turn left on Battery Avenue and go west approximately 0.25 mile to State Street. Turn right on State Street and go north approximately 0.1 mile to Meherrin Street. The reference mark is chiseled cross in top of concrete curb at southeast intersection of Meherrin Street and State Street.
RM 10	02	109.403	In courthouse lawn on U. S. Route 301 (Main Street), the bench mark is standard USC&GS disk, stamped U 70 1935, set in top of concrete post flush with ground. Post is located 48 feet west-southwest of northwest corner of courthouse, 5 feet north of north edge of west entrance sidewalk, and 4 feet east of west curb around courthouse lawn.
RM 11	02	101.73	From courthouse on U. S. Route 301 (Main Street), go south 0.05 mile along U. S. Route 301 (Main Street) to Brunswick Avenue - Hicksford Avenue. Turn left on Hicksford Avenue and go east along Hicksford Avenue approximately 0.40 mile to bridge crossing the Meherrin River. Bench mark is standard COE disk, stamped BM EM6 1976, embedded in east abutment of bridge on north side of Hicksford Avenue.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 12	02	122.946	From courthouse on U. S. Route 301 (Main Street), go south along U. S. Route 301 (Main Street) approximately 0.6 mile to Laurel Street - Low Ground Road. Turn left on Low Ground Road and travel southeast approximately 0.1 mile to Esso Oil Company storage plant. Bench mark is standard USC&GS disk, stamped S70 1935, set in concrete driveway leading to storage plant. An 8 x 8 inch form was built around mark when concrete driveway was placed. Mark is approximately 2 inches below surface of driveway.

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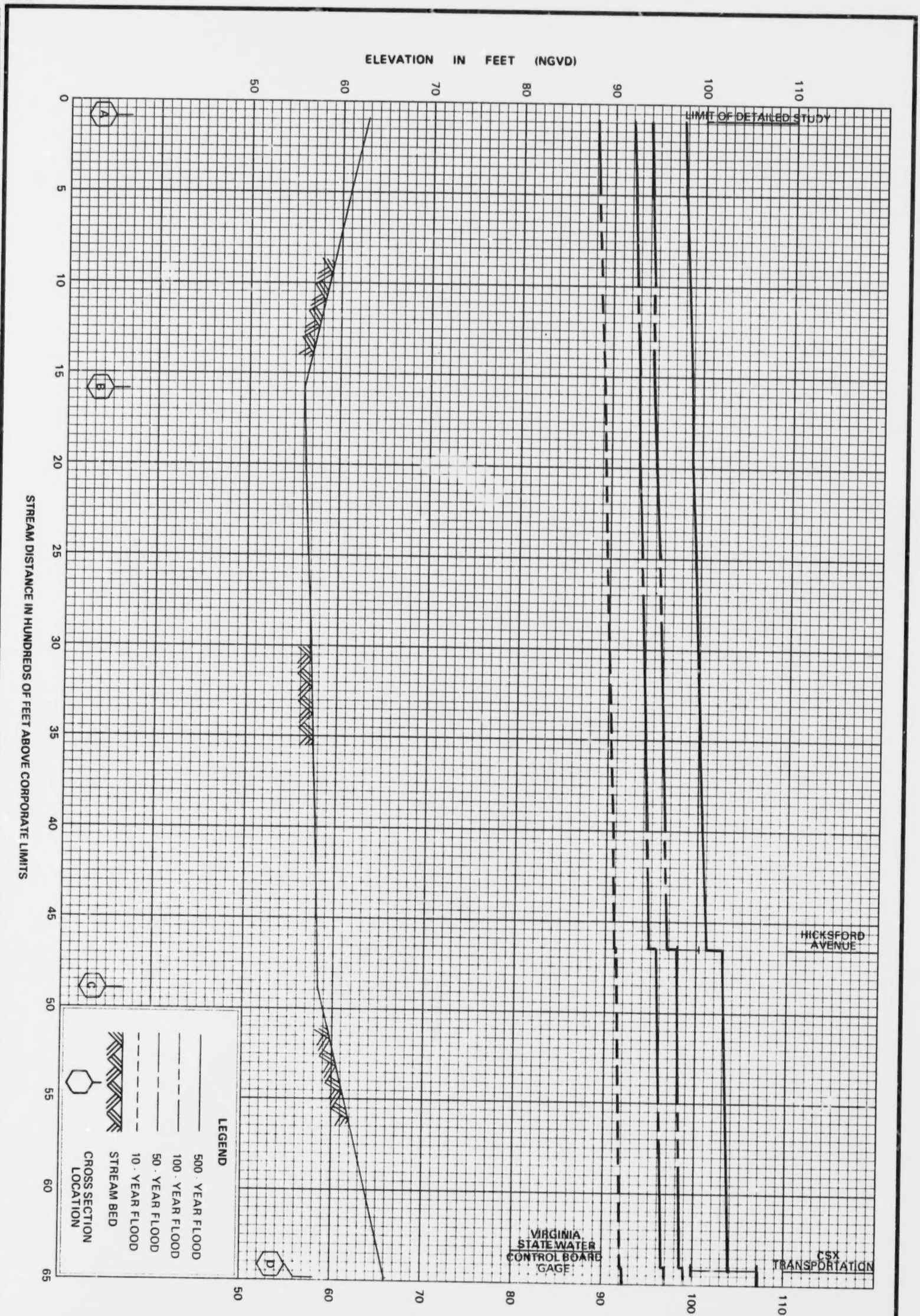
A & E INC. BALTIMORE



FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA

(INDEPENDENT CITY)

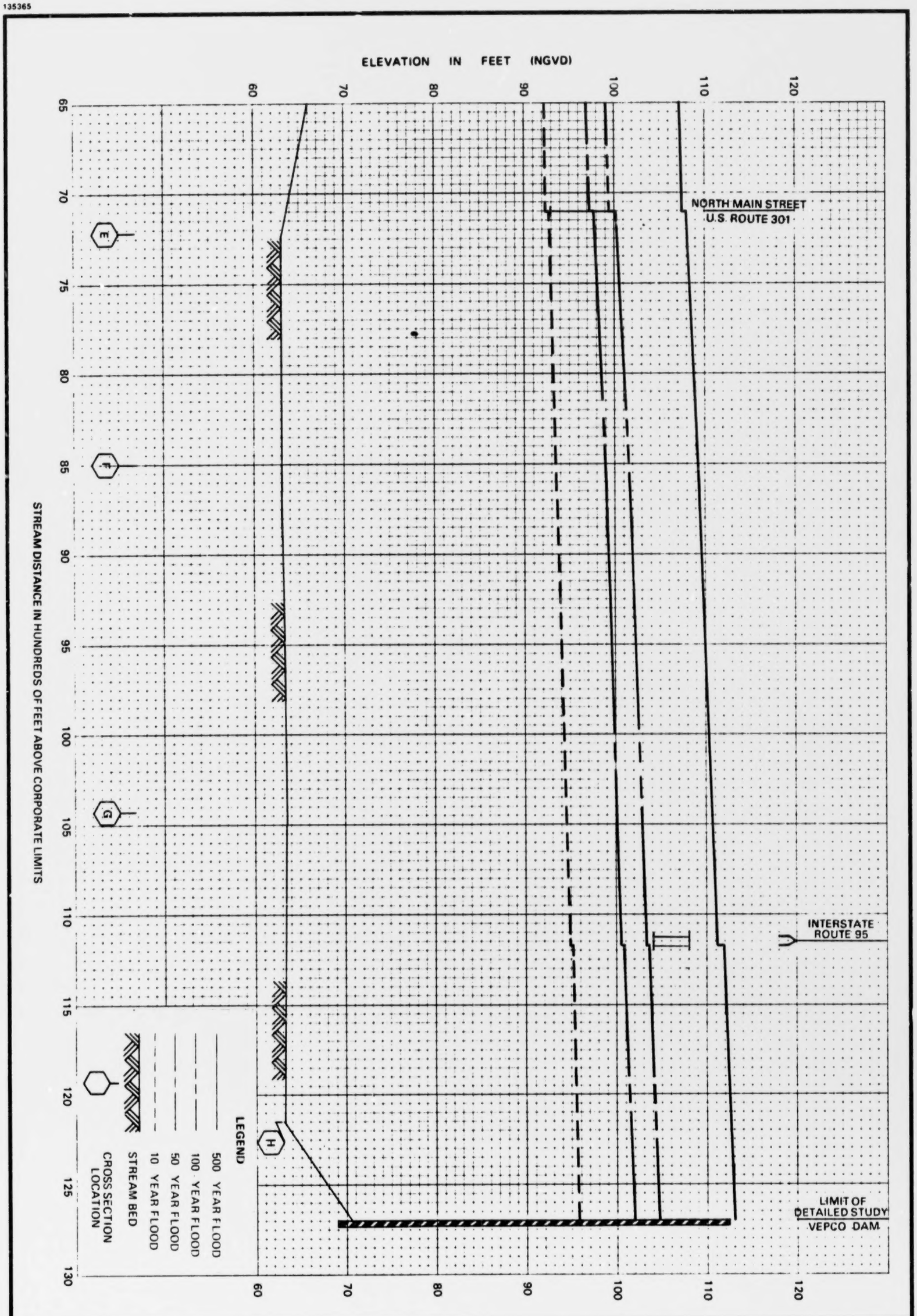
FLOOD PROFILES

MEHERRIN RIVER

01P

135365

A & E INC BALTIMORE



02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA
(INDEPENDENT CITY)

FLOOD PROFILES

MEHERRIN RIVER

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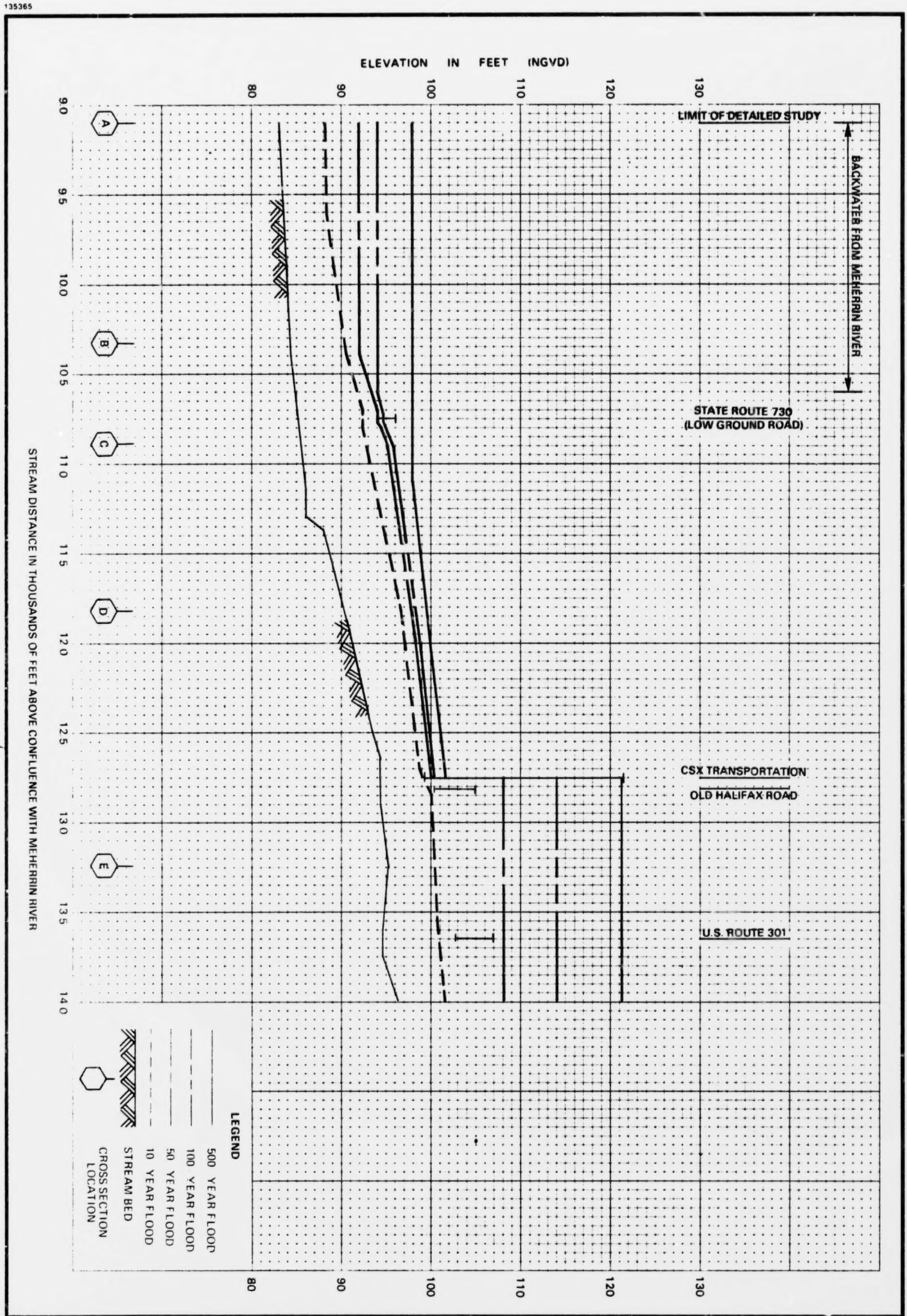
135365

A & E INC BALTIMORE



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FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA

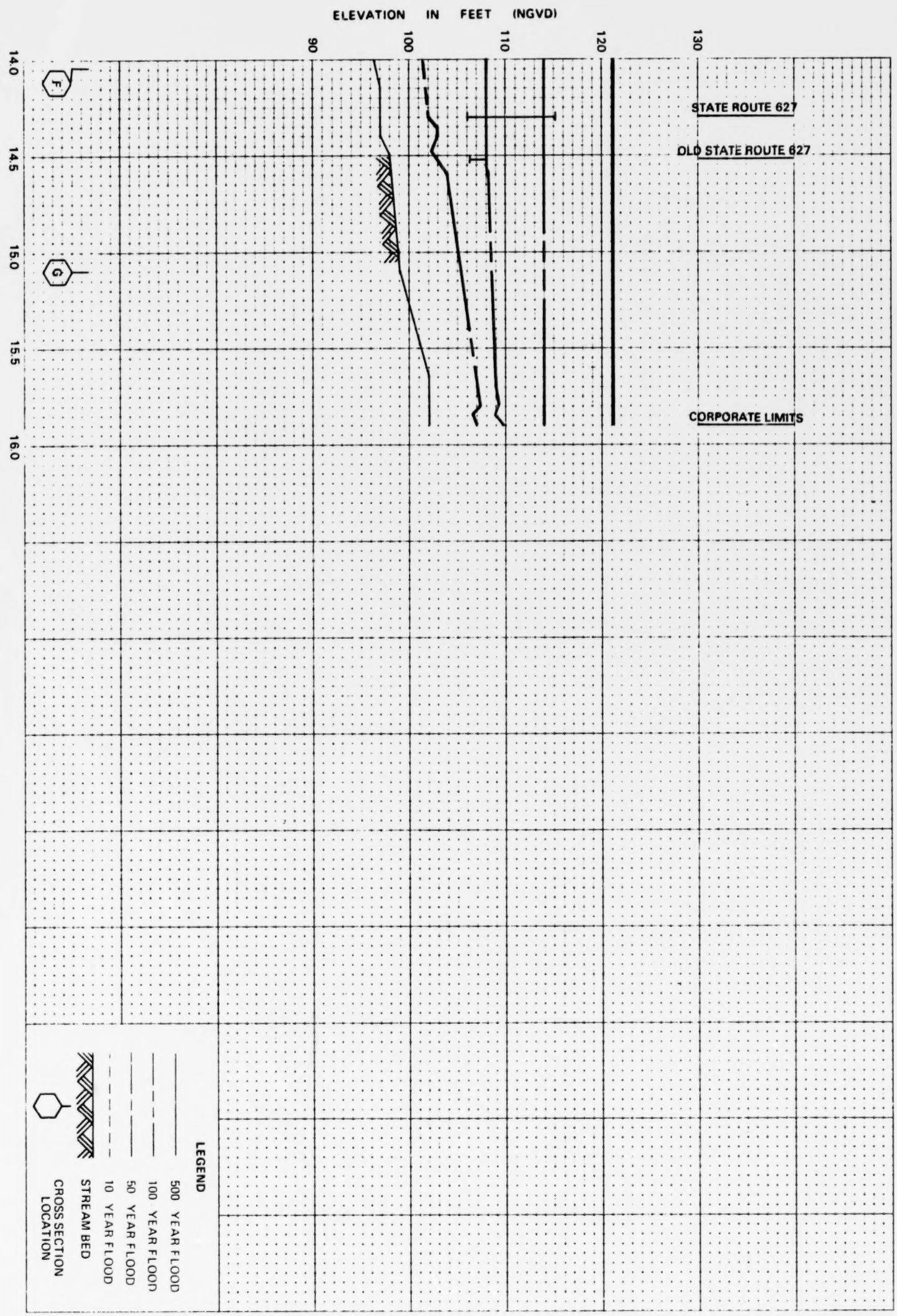
(INDEPENDENT CITY)

FLOOD PROFILES

FALLING RUN

135365

A&E INC BALTIMORE



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FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EMPORIA, VA
(INDEPENDENT CITY)

FLOOD PROFILES

FALLING RUN